

**COMPLETE LIST OF CLAIMS**

1           1. (Currently Amended) A variable condition responsive sensor system  
2 comprising a plurality of at least one variable condition sense elements having first and  
3 second half bridges, the first half bridge providing a first output and the second half  
4 bridge providing a second output ~~first and second outputs~~, the variable condition being  
5 one of pressure, acceleration, force and torque,  
6           first and second signal conditioning paths, the first output of the plurality of ~~at~~  
7 ~~least one~~ sense elements connected to the first signal conditioning path and the second  
8 output of the plurality of at least one sense elements connected to the second signal  
9 conditioning path,  
10           at least one multiplexer with addressable ports connected to outputs of each  
11 half bridge of the plurality of sense elements, the at least one multiplexer having an  
12 output port connected to at least one signal conditioning path,  
13           memory for storing calibration and characterization data for the at least one  
14 sense element and the signal conditioning paths, and  
15           an interface circuit for transmitting data from the memory to the signal  
16 conditioning components for separately conditioning the signals of the at least one sense  
17 element and to an external controller to perform mathematical corrections of the  
18 conditioned signals and for comparing the conditioned signals of the at least one sense  
19 element.

Claim 2 (Canceled)

Claim 3 (Canceled)

1           4. (Currently Amended) A variable condition responsive sensor system according  
2 to claim 1 [[2]] in which each half bridge has a bias node and a ground node and further  
3 comprising an independent variable resistor connected in series between a voltage  
4 source and an output port of the at least one multiplexer.

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1           5. (Currently Amended) A variable condition responsive sensor system  
2 according to claim 1 ~~[[3]]~~-in which the signal conditioning paths and the at least one  
3 multiplexer are formed in an ASIC.

1           6. (Original) A variable condition responsive sensor system according to claim 5  
2 in which the memory is non-volatile.

1           7. (Original) A variable condition responsive sensor system according to claim 6  
2 in which the non-volatile memory is formed in a separate IC.

1           8. (Original) A variable condition responsive sensor system according to claim 1  
2 in which the variable condition is pressure.

1           9. (Currently Amended) A variable condition responsive sense element system  
2 comprising  
3           a plurality of variable condition responsive sense elements providing an  
4 output dependent on the variable condition, the variable condition being one of pressure,  
5 acceleration, force and torque, the sense elements each having first and second half  
6 bridges, each bridge half having a bias node, a ground node and a respective positive  
7 and minus output node,  
8           a voltage source,  
9           an electronic circuit having first, second, third and fourth multiplexers, each  
10 having an output and a plurality of address input positions,  
11           a respective independent variable resistor connected in series between the  
12 voltage source and the output of each of the first and third multiplexers, the bias node of  
13 each half bridge of each sense element connected to a respective multiplexer address  
14 position of the respective first and third multiplexers,  
15 ~~separate signal conditioning paths,~~  
16           the minus output node of each sense element connected to a respective  
17 multiplexer address position of the second multiplexer, the positive node of each sense  
18 element connected to a respective multiplexer address position of the fourth multiplexer,

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19 a respective separate signal path connected to the output of each multiplexer,  
 20 an analog to digital converter having a plurality of inputs and an output, the  
 21 signal paths being connected to the inputs of the analog to digital converter,  
 22 a data register having an input and an output, the output of the analog to  
 23 digital converter connected to the input of the data register,  
 24 a data transfer circuit connected to the data register and having connections  
 25 for an external controller, said data transfer circuit capable of transferring data to and  
 26 from the external controller, and  
 27 a memory, the memory being connected to the data transfer circuit, the  
 28 memory providing analog trim settings for the sense element signal paths, and data for  
 29 the external controller enabling the external controller to perform mathematical  
 30 compensation for the variable condition sense element signals.

1 10. (Original) A variable condition responsive sensor system according to claim  
 2 9 in which the data transfer circuit is a serial peripheral interface bus.

1 11. (Currently Amended) [[In]]A method for detecting sensor faults in a variable  
 2 condition responsive sensor system having a plurality of variable condition sense  
 3 elements, the method of comprising:  
 4 forming each of the sense bridge elements so as to have first and second half  
 5 bridges, the first half bridge providing a first output and the second half bridge providing  
 6 a second output into two portions, each portion having an output node,  
 7 providing at least one multiplexer with addressable ports connected to the  
 8 outputs of each half bridge of the plurality of sense elements,  
 9 separately conditioning output signals from each output node of a selected  
 10 sense element, and  
 11 comparing a linear computation of the separately conditioned signals of the  
 12 first and second half bridges portions of the selected sense element with each other to  
 13 determine whether the conditioned signals come within selected tolerance bands.

Claim 12 (Canceled)

1        13. (Currently Amended) The method of claim 11 ~~[[12]]~~ in which the step of  
2        comparing the separately conditioned signals includes subtracting the conditioned signal  
3        of one half bridge from the conditional signal of the other half bridge of a sense element  
4        and taking the average of the difference in the two conditioned signals.

1        14. (Currently Amended) The method of claim 11 ~~[[12]]~~ further comprising  
2        forming an electronic circuit having signal conditioning paths, the paths  
3        having signal conditioning components for each half bridge output,  
4        obtaining electronic calibration data for each sense element during  
5        manufacture of the sensor system and storing that information in memory,  
6        connecting the outputs of the bridge halves of a selected sense element to  
7        the respective signal conditioning circuit paths using basic calibration data from the  
8        memory and separately, partially conditioning the selected output signal, and  
9        completing the separate conditioning of the partially conditioned signal by  
10       performing mathematical corrections using data transferred from the non-volatile  
11       memory to obtain fully conditioned signals before the comparison step of the separately  
12       conditioned signals.

1        15. (Currently Amended) The method of claim 11 ~~[[12]]~~ further comprising  
2        forming an electronic circuit having multiplexers, a signal conditioning path  
3        having signal conditioning components for each half bridge output, an analog to digital  
4        converter, memory and an interface circuit for transmitting and receiving data,  
5        obtaining electronic calibration data for each half bridge sense element  
6        during manufacture of the sensor system and storing that information in memory,  
7        connecting the electronic circuit to an external controller,  
8        transmitting data from memory to enable the external controller to perform  
9        mathematical corrections to a conditional digital signal,  
10       selecting an address of the multiplexers for connecting the output of a  
11       selected half bridge of a selected sense element to the respective signal conditioning  
12       circuit path and to transmit basic calibration data to the signal conditioning components  
13       in the signal conditioning path,

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14 partially conditioning the addressed sense element half bridge using the  
15 basic calibration data transmitted from memory to provide a partially conditioned signal,  
16 converting the partially conditioned signal from an analog format to a digital  
17 format in the analog to digital converter to provide a digital signal,  
18 transmitting the digital signal to the external controller,  
19 completing the conditioning of the partially conditioned signal by performing  
20 mathematical corrections to the digital signal in the external controller using the data  
21 transferred from the memory to obtain fully separately conditioned signals before the  
22 comparison step of the separately conditioned signals.

1 16. (Original) The method of claim 15 in which the interface circuit comprises a  
2 serial peripheral interface bus.

1 17. (Original) The method of claim 15 in which each half bridge has a bias node  
2 and further comprising the step of multiplexing the bias node into connection with an  
3 independent variable resistor serially connected to a voltage source.